RESEARCH DEPARTMENT

U.H.F. TRANSMITTING AERIAL FOR THE DOVER TELEVISION STATION

Technological Report No. RA-3/6
UDC 621.396.712 1967/28

G.H. Millard, B.Sc., A.Inst.P.

for Head of Research Department

This Report uses SI units in accordance with B.S. document PD 5686.

May 1967. Technological Report No. RA-3/6
UDC 621.396.712 1967/28

U.H.F. TRANSMITTING AERIAL FOR THE DOVER TELEVISION STATION

INTRODUCTION

A u.h.f. aerial for the South-East Kent area has been built as a topmast on the ITA mast at Dover. The station started test transmissions on 28th January 1967 and came into service on 11th February 1967.

SUMMARY OF INSTALLATION

Site: The site is at Church Hougham 5 km (3 miles) south-west of Dover, grid reference TR/274396, height 137 m (450 ft) a.o.d.

Support Structure: The support structure consists of a 228·6 m (750 ft) mast of triangular cross-section.

General Arrangement: See Fig. 1.

Channels: The aerial is designed to operate on the two BBC Channels 50 and 56, of which the latter is used for the opening service (BBC-2). Channel 50 has zero offset and Channel 56 has negative offset.

Aerial: The aerial comprises two tiers, each of three 5λ panels. The panels, which are manufactured by Siemens and Halske, have been modified so that each half panel is fed separately. The panels are supported on a 559 mm (22 in.) diameter circle by a 273 mm (10¾ in.) diameter steel support pole. The whole aerial is enclosed within a 1·52 m (5 ft) diameter glass-fibre cylinder. The effective radiating length of the aerial is 10·0λ at Channel 50 and 10·7λ at Channel 56. Fig. 2 shows the arrangement of the panels inside the glass-fibre cylinder and Fig. 3 shows the construction of each panel.

The mean height of the aerial is 236·5 m (776 ft) a.g.l.

Feeders: The arrangement of the distribution feeders is shown schematically in Fig. 4. Each half of the aerial is connected to the transmitters by a main feeder type HF - 4.1/8 - 50.

Power: Two 6·25 kW vision transmitters and two 1·25 kW sound transmitters will be provided for each channel; at present only those for Channel 56 have been installed. The transmitters are run at the power required to give the maximum effective radiated power (e.r.p.) of 100 kW permitted under the Stockholm Agreement. The first month of service was with power reduced by 1·1 dB pending Post Office approval to the h.r.p. templet.

Each vision transmitter is combined with a sound transmitter and the combined outputs are paralleled by means of a diplexer followed by a splitter transformer in order to eliminate differences between the modulation characteristics of the vision transmitters. A two-channel combining unit will be added later, when required.

Templet and horizontal radiation pattern (h.r.p.) The h.r.p. was required to be directional with an e.r.p. not exceeding 100 kW at the maximum of the h.r.p. The templet and the h.r.p.s at the vision carrier frequencies of the operating channels are shown in Figs. 5

and 6. These h.r.p.s are the mean of measurements on each half of the final full-scale aerial.

Vertical radiation pattern (v.r.p.) The v.r.p. was specified to be gapfilled and the maximum of radiation to be tilted 1·4° ± 0·2°. Gapfilling is achieved by means of a phase distribution of the feed currents over the length of the aerial. The v.r.p.s obtained for each face, shown in Figs. 7-9, were computed from measurements of the amplitudes and phases of the feeds to the aerial panels, taken after erection.

Gain:

Channel		50		56
		dB		dB
Mean intrinsic gain		10·8		11·1
Deduct aerial losses:				
Gapfilling	0·6		0·8	
Distribution feeder	0·2		0·2	
Distribution transformers	0·1	0·9	0·1	1·1
Mean net gain		9·9		10·0
Deduct other losses:				
Main feeder	2·5		2·5	
Feeder ground run	0·2		0·2	
Diplexer and splitter	0·1	2·8	0·1	2·8
Mean effective gain		7·1		7·2
H.R.P. max/mean ratio		3·3		3·4
Maximum effective gain		10·4		10·6

Programme feed: Temporary BBC link; to be replaced later by GPO link.

ACKNOWLEDGMENTS

The mechanical and electrical design, construction and setting to work of the aerial were carried out by E.M.I. Electronics Ltd. in association with Siemens and Halske AG. The contracting authority was the Planning and Construction Department of the Independent Television Authority.

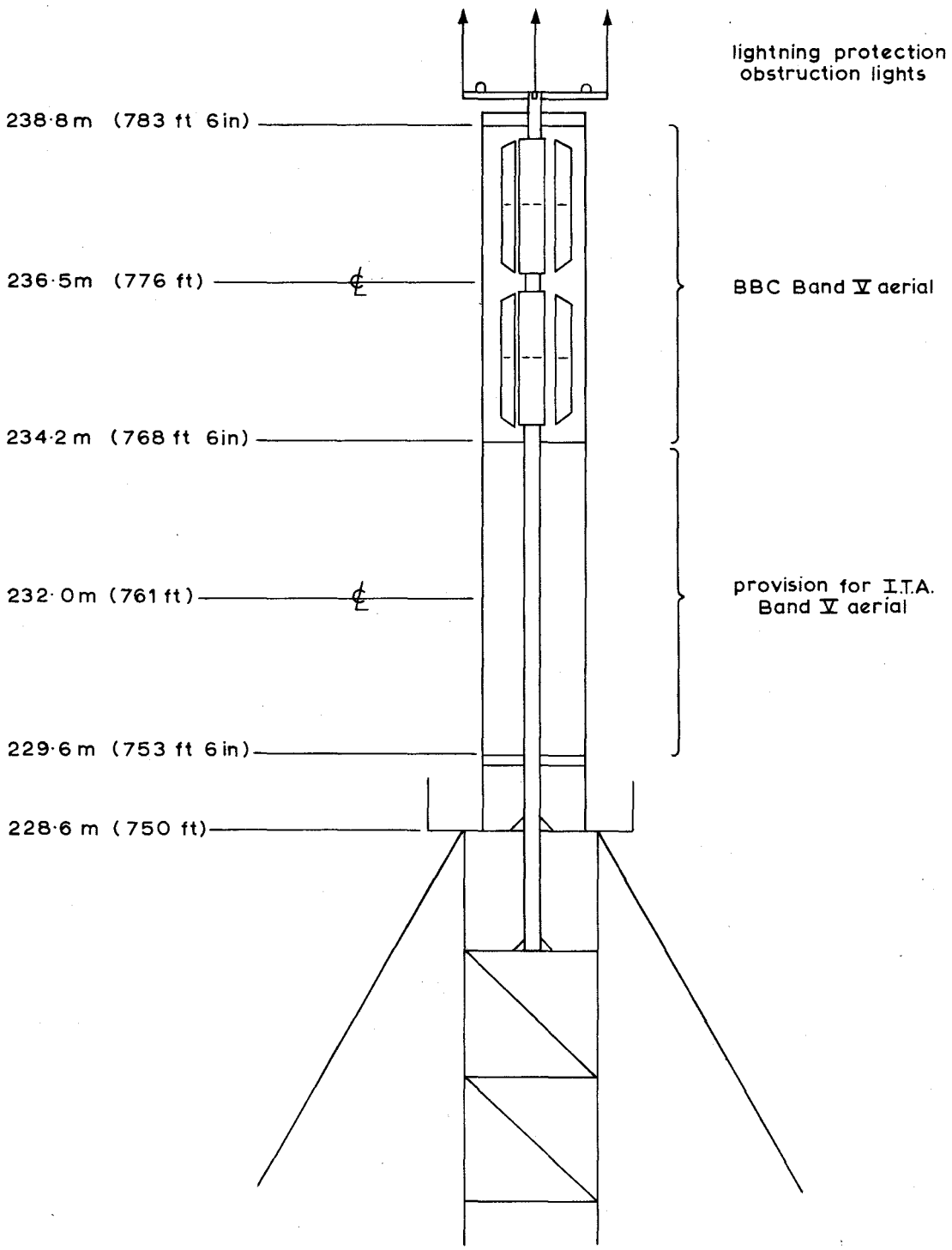

Fig. 1. General arrangement of aerials on mast.

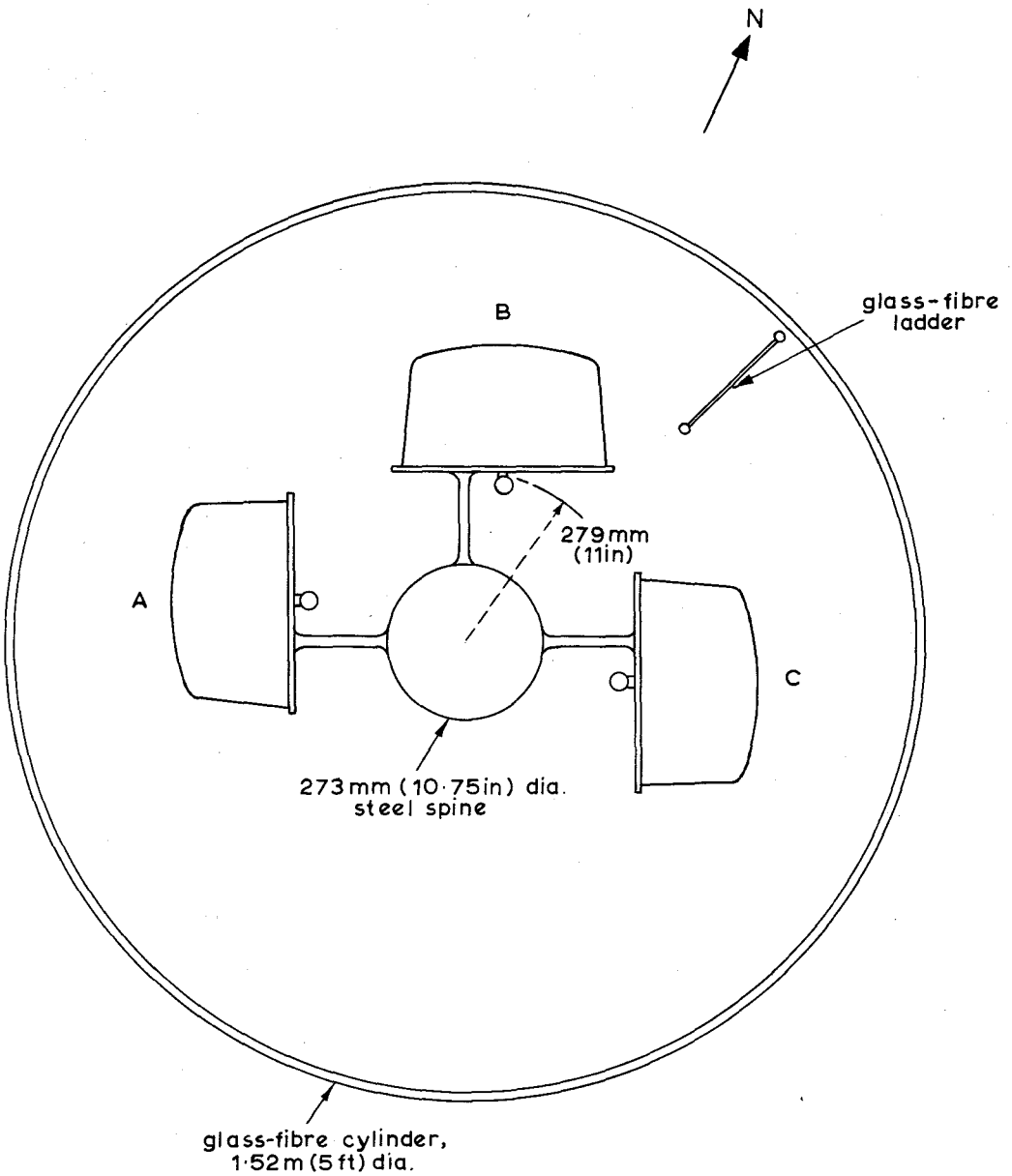

Fig. 2. Arrangement of aerial panels in glass-fibre cylinder.

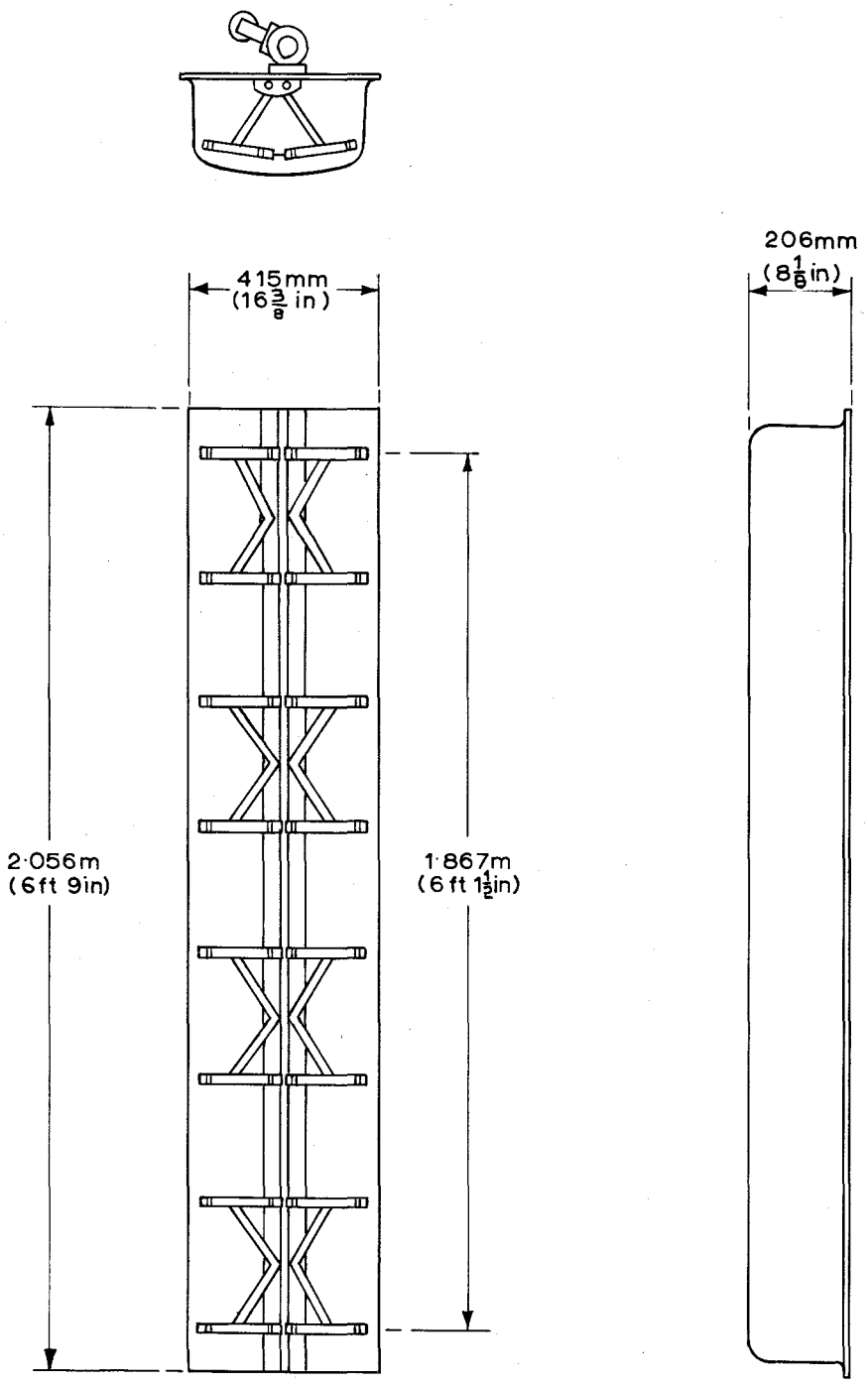

Fig. 3. Construction of aerial panel

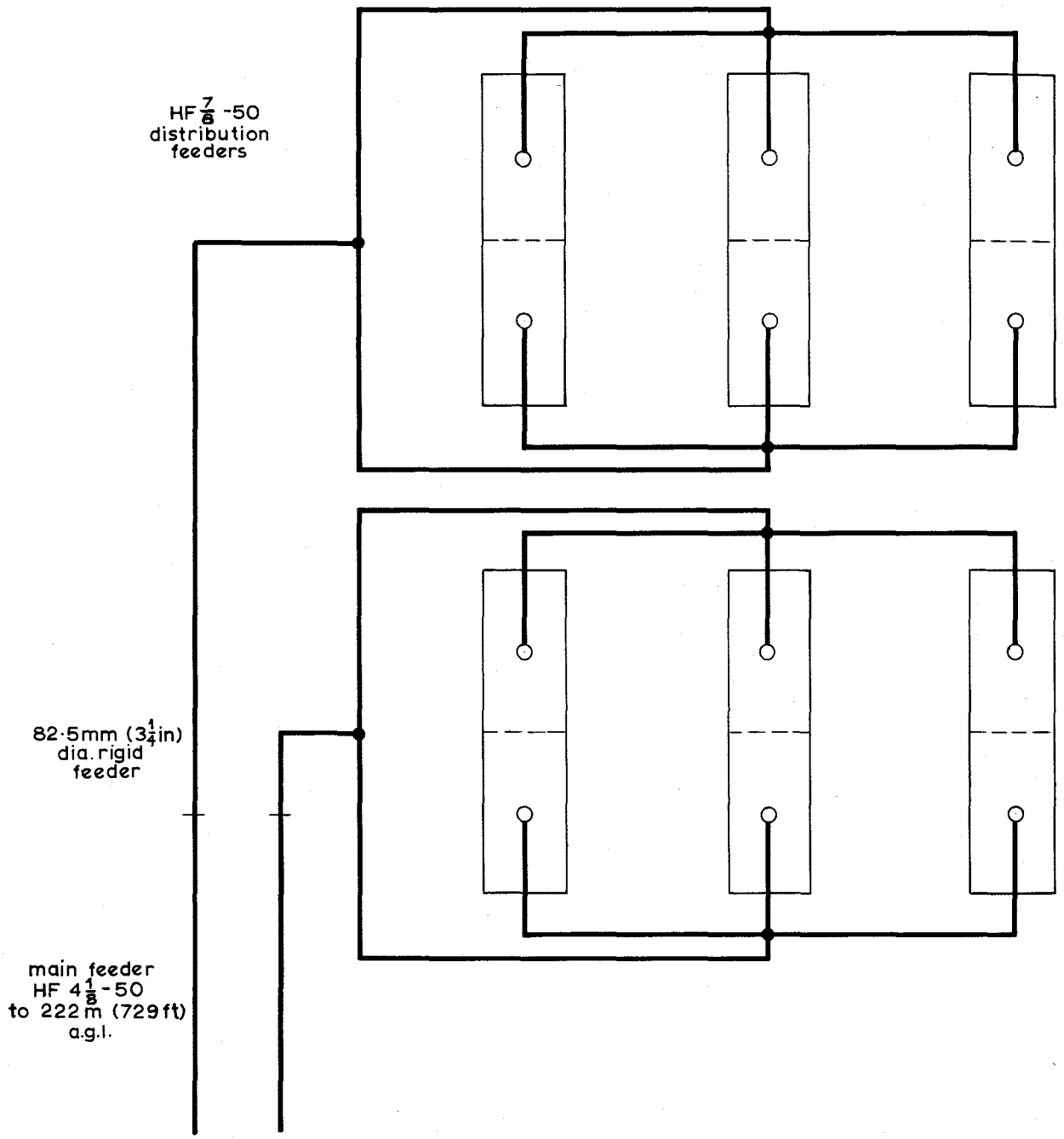

Fig. 4. Schematic arrangement of distribution feeders.

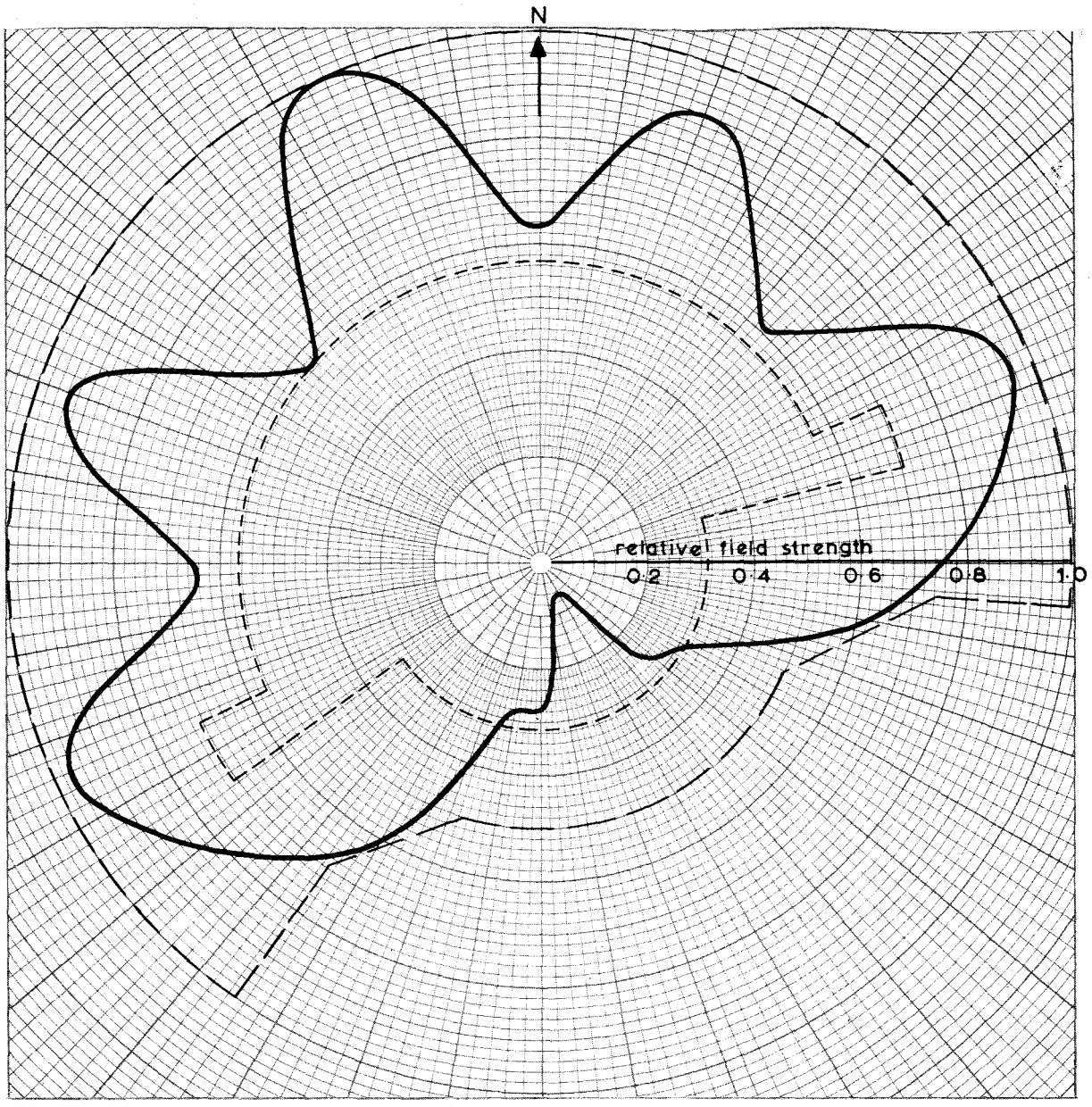

Fig. 5. Horizontal radiation pattern: Channel 50

HORIZONTAL POLARIZATION

Vision carrier 703·25 MHz, Sound carrier 709·25 MHz

Mean effective gain: 7·1 dB

Peak vision transmitter power: 2 x 4·6 kW

Mean E.R.P.: 47 kW

— — — — E.R.P. limit agreed post Stockholm

– – – – – – – Minimum desirable E.R.P.

Unit field corresponds to an E.R.P. of 100 kW

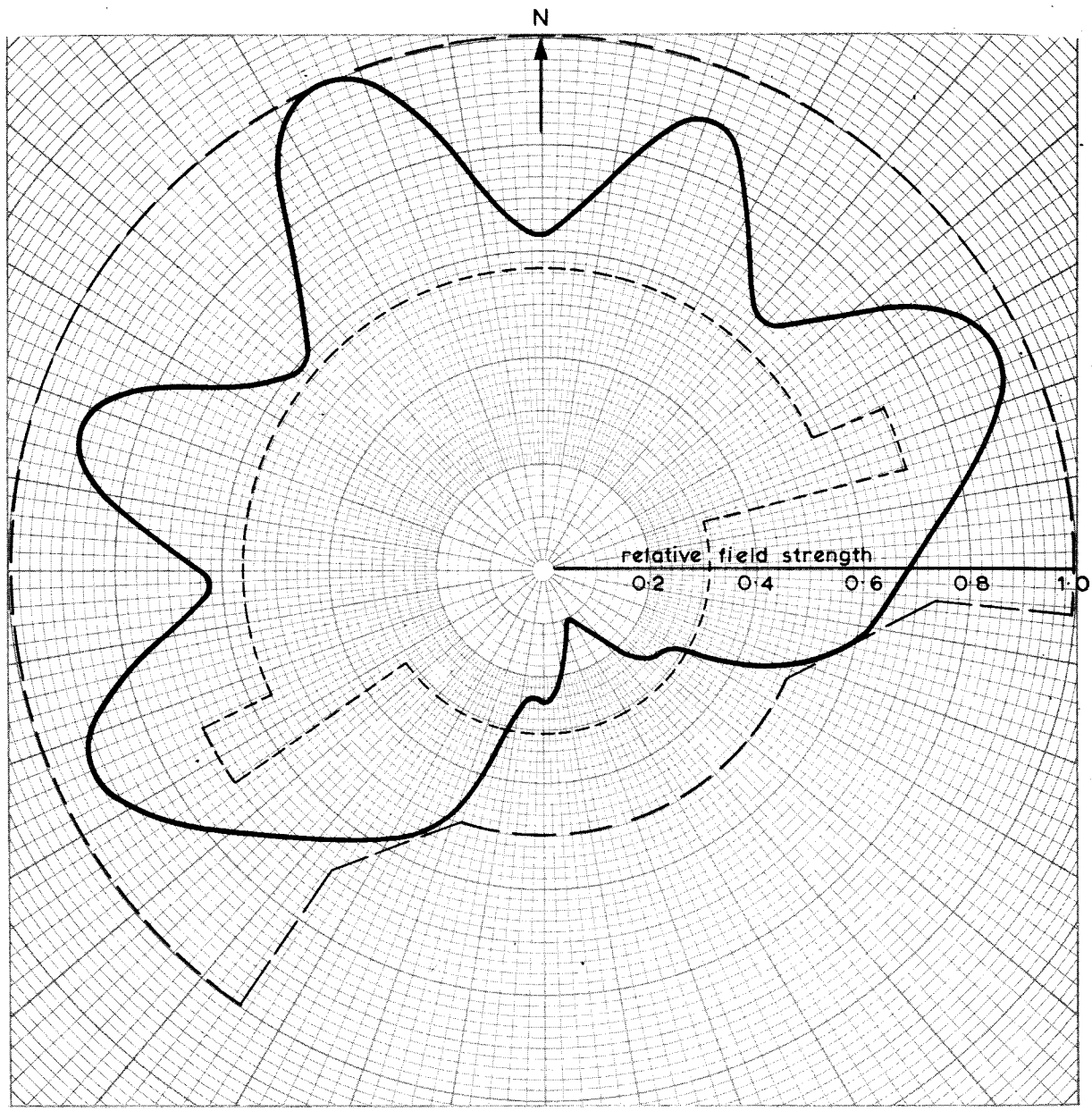

Fig. 6. Horizontal radiation pattern: Channel 56

HORIZONTAL POLARIZATION

Vision carrier 751·25 MHz, Sound carrier 757·25 MHz

Mean effective gain: 7·2 dB

Peak vision transmitter power: 2 x 4·4 kW

Mean E.R.P.: 46 kW

—— —— —— E.R.P. limit agreed post Stockholm

– – – – – – – Minimum desirable E.R.P.

Unit field corresponds to an E.R.P. of 100 kW

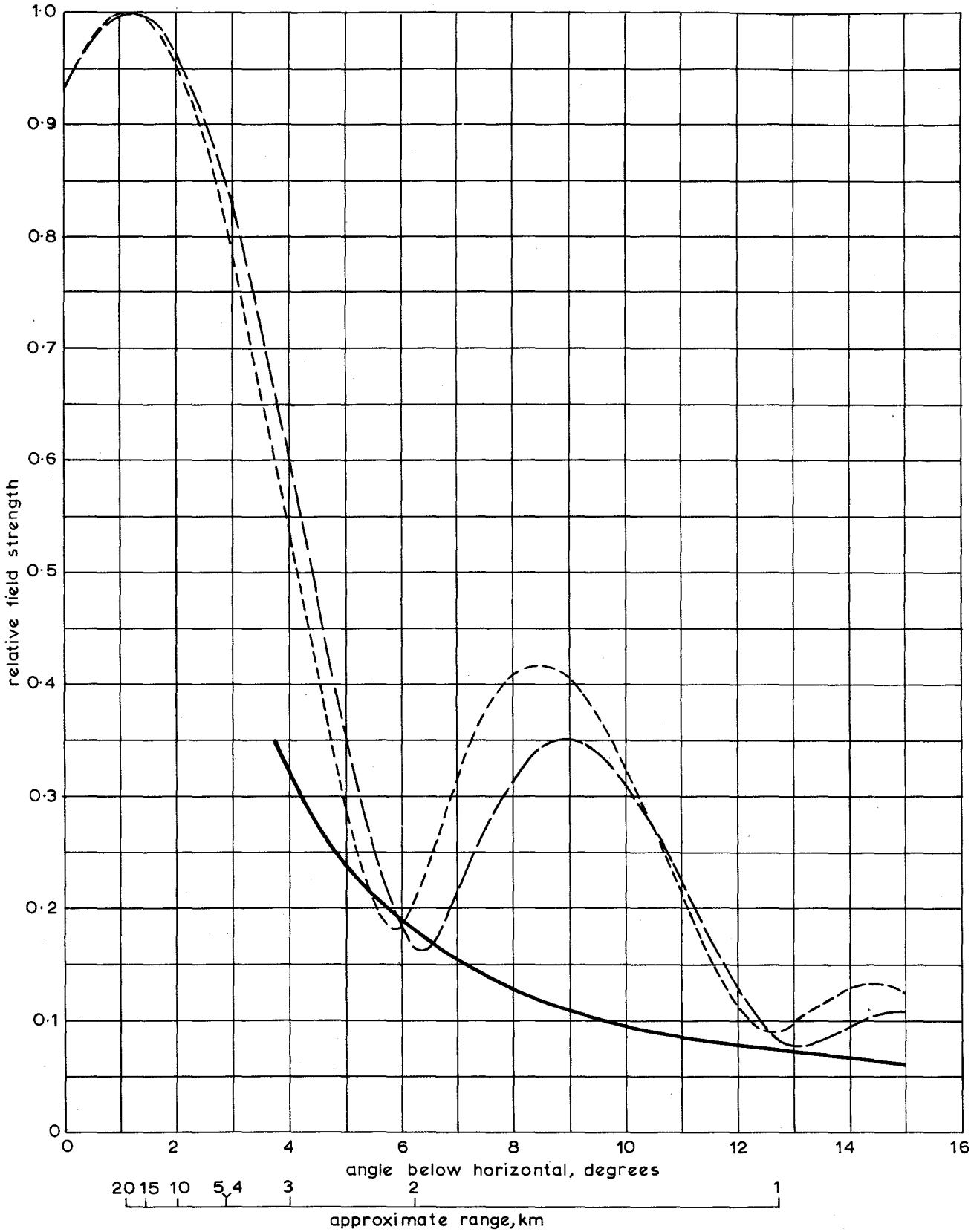

Fig. 7. Vertical radiation pattern on bearing 245° ETN (face A)

——— Channel 50
- - - - - - - Channel 56
——— Specified minimum field

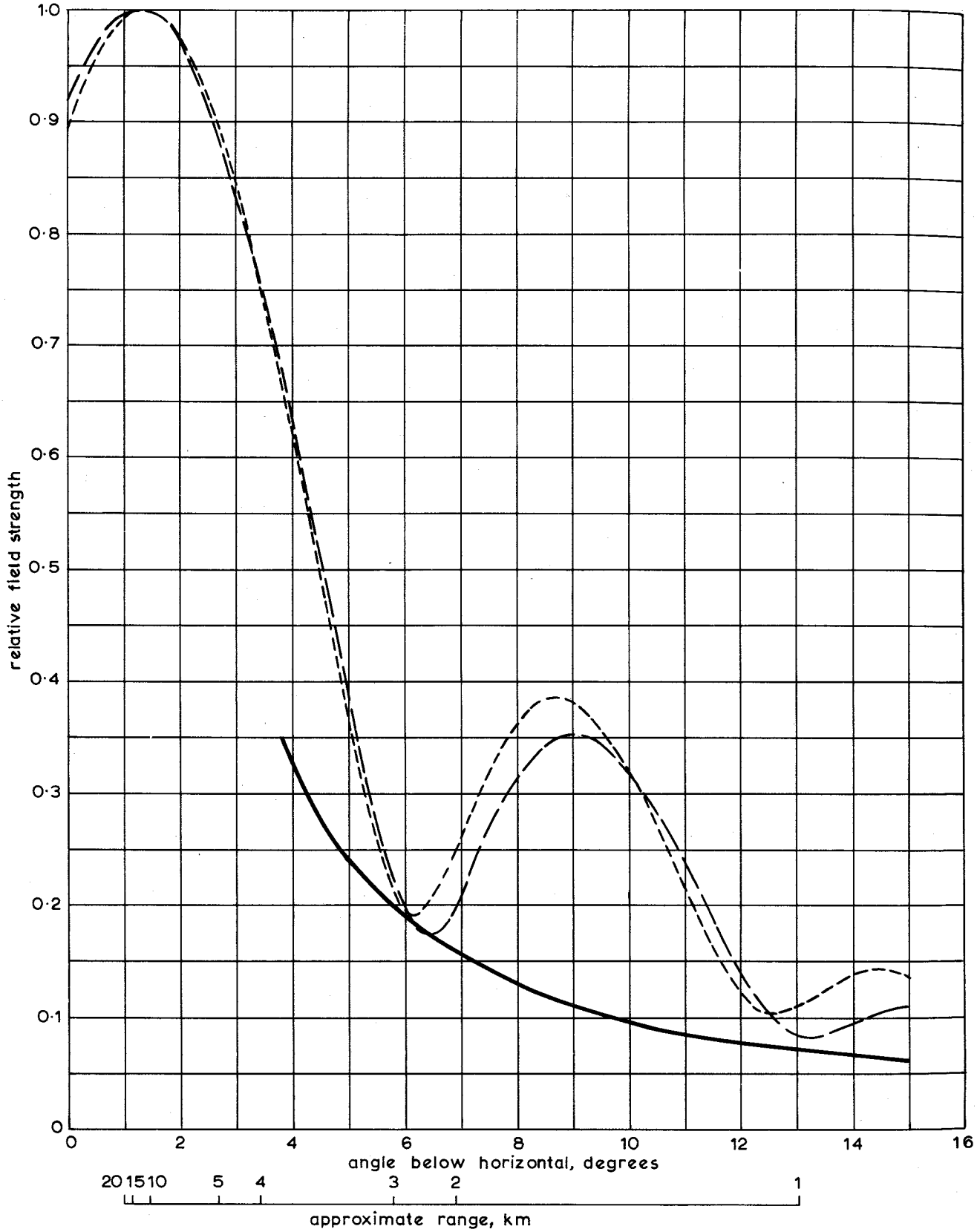

Fig. 8. Vertical radiation pattern on bearing 335° ETN (face B)

——— Channel 50
– – – – – Channel 56
——— Specified minimum field

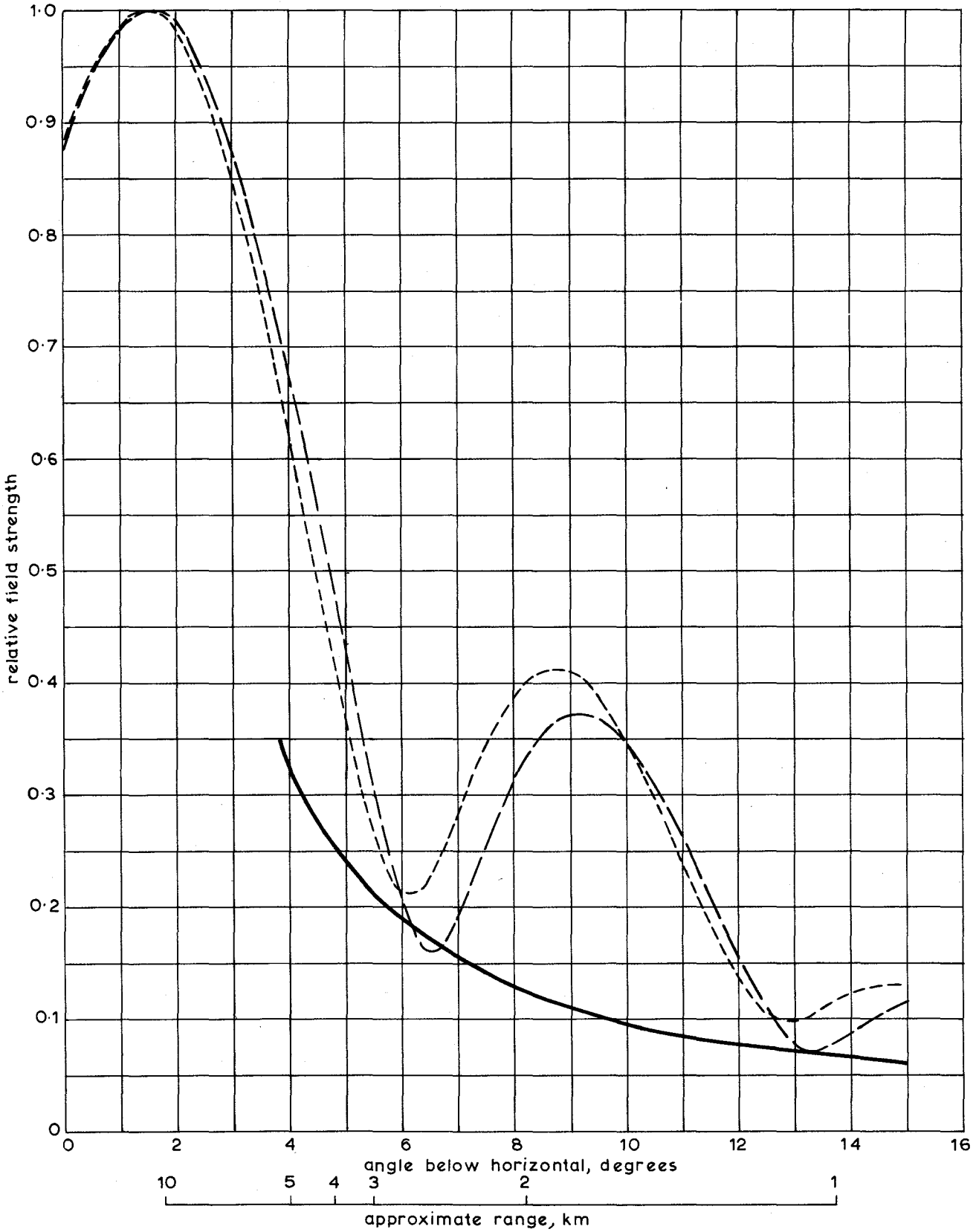

Fig. 9. Vertical radiation pattern on bearing 065° E T N (face C)

——— Channel 50
– – – – – Channel 56
——— Specified minimum field